CLAIMS

What is claimed is:

1. A wireless device that communicates across a spectrum having a plurality of sub-channels, comprising:

a plurality of antennas through which the wireless device communicates with another wireless device, each antenna communicates with the other wireless device via an associated communication pathway;

sub-channel power analysis logic coupled to the antennas and adapted to determine which communication pathway has the highest communication quality on a sub-channel by sub-channel basis; and

diversity selection logic coupled to the sub-channel power analysis logic and adapted to determine a weighting vector for an associated antenna based on the communication quality, wherein the weighting vector specifies a relative transmission power for each sub-channel for the associated antenna.

2. The device of claim 1, wherein the weighting vector for the associated antenna comprises a plurality of bits, each bit corresponding to one sub-channel, and each bit indicating whether the antenna is used to transmit on the corresponding sub-channel.

3. The device of claim 1, wherein the weighting vector represented in a proportional format comprises a plurality of values, each value corresponding to a

sub-channel and each value being indicative of an amount of power to be provided to the associated antenna.

4. The device of claim 3, wherein the amount of power to be provided to an antenna is determined by the number of signal transmissions since the communication quality for each sub-channel of the associated communication pathway was most recently determined.

5. The device of claim 3, wherein the amount of power to be provided to an antenna is based on the communication quality of each sub-channel in the associated communication pathway.

6. The device of claim 3, wherein the amount of power to be provided to an antenna is determined by the amount of time elapsed since the communication quality for each sub-channel of the associated communication pathway was most recently determined.

7. The device of claim 1, wherein the wireless device may wirelessly communicate with a plurality of wireless stations.

8. The device of claim 1, further comprising a signal splitter coupled to the diversity selection logic and adapted to reproduce signals to be transmitted.

9. A method, comprising:

transmitting data from a first wireless device to a second wireless device using a plurality of antennas, wherein each antenna communicates with the second wireless device via an associated communication pathway;

determining channel characteristics associated with each of the antennas;

on a per sub-channel basis, computing a weighting vector for each antenna based on the channel characteristics;

for each communication pathway, combining a transmission signal with the weighting vector to form a weighted transmission signal; and

transmitting the weighted transmission signal from the second wireless device to the first wireless device via a plurality of communication pathways.

10. The method of claim 9, wherein the first wireless device transmits data to a plurality of wireless devices and receives data from a plurality of wireless devices.

11. The method of claim 9, wherein each weighting vector specifies a relative transmission power for each sub-channel.

12. The method of claim 9, wherein computing the weighting vector comprises representing the weighting vector using a plurality of bits, each bit corresponding to a different sub-channel, and each bit indicating whether an antenna associated with the weighting vector is used to transmit data on the corresponding sub-channel.

13. The method of claim 9, wherein computing the weighting vector comprises representing the weighting vector in a ratio format;

wherein the ratio format specifies the amount of power to be applied to an antenna associated with the weighting vector for each sub-channel.

14. The method of claim 13, wherein specifying the amount of power to be applied to an antenna is based on the communication quality of each sub-channel in the associated communication pathway.

15. The method of claim 14, wherein specifying the amount of power to be applied to each antenna is further based on the number of data transmissions since the communication quality of the associated communication pathway was most recently determined.

16. The method of claim 14, wherein specifying the amount of power to be applied to each antenna is further based on the amount of time elapsed since the communication quality of the associated communication pathway was most recently determined.

17. The method of claim 9, wherein channel characteristics comprise a signal-to-noise ratio.

18. A system, comprising:

an access point having a plurality of antennas; and

a wireless station in communication with the access point via a single antenna in the wireless station;

wherein the antennas in the access point receive a data signal from the antenna in the wireless station via a plurality of communication pathways, each communication pathway comprising a plurality of sub-channels;

wherein the access point determines channel characteristics and a weighting vector for each antenna, each weighting vector being indicative of the amount of power to be provided to each sub-channel for an associated antenna;

wherein the access point reproduces a data transmission signal, combines each copy of the data transmission signal with a different weighting vector to produce weighted transmission signals, and transmits each weighted transmission signal to the wireless station via a separate communication pathway.

19. The system of claim 18, wherein the weighting vector comprises a plurality of bits, each bit corresponding to one sub-channel, and each bit indicating whether an antenna associated with the weighting vector is used to transmit on the corresponding sub-channel.

20. The system of claim 18, wherein the weighting vector comprises a plurality of values, each value corresponding to a sub-channel and each value being

representative of an amount of power to be applied to an antenna associated with the weighting vector.

21. The system of claim 20, wherein the amount of power to be applied to a particular antenna for a particular sub-channel is based on the number of data transmissions since the quality of the associated communication pathway was last determined; and

wherein the amount of power to be provided to a particular antenna for a particular sub-channel is further based on the signal-to-noise ratio associated with that antenna.

22. The system of claim 20, wherein the amount of power to be applied to a particular antenna for a particular sub-channel is based on the amount of time elapsed since the quality of the associated communication pathway was last determined; and

wherein the amount of power to be provided to a particular antenna for a particular sub-channel is further based on the signal-to-noise ratio associated with that antenna.

23. A method, comprising:

for each of a plurality of antennas, determining communication quality of each sub-channel of a communication pathway, the communication pathway comprising a plurality of sub-channels;

for each sub-channel, selecting at least one antenna for data transmission based on the communication quality of said antenna; and

concurrently transmitting data via the plurality of antennas across the plurality of sub-channels.

24. The method of claim 23, wherein determining the communication quality comprises determining a signal-to-noise ratio for each antenna and for each sub-channel; and

wherein, for each sub-channel, selecting at least one antenna comprises selecting only the antenna having the highest signal-to-noise ratio.

25. The method of claim 23, wherein determining the communication quality comprises determining a signal-to-noise ratio for each antenna and for each sub-channel; and

wherein, for each sub-channel, selecting at least one antenna comprises selecting a plurality of antennas and providing power to each antenna based on the number of data transmissions since the communication quality was most recently determined.

26. The method of claim 23, wherein determining the communication quality comprises determining a signal-to-noise ratio for each antenna and for each sub-channel; and

wherein, for each sub-channel, selecting at least one antenna comprises selecting a plurality of antennas and providing power to each

antenna based on the amount of time elapsed since the communication quality was most recently determined.